

What is claimed:

1. A method for controlling the sialic acid content of a protein produced by mammalian cells comprising culturing the cells in a medium comprising galactose and fructose.
2. The method of claim 1, wherein the medium further comprises mannose.
3. The method of claim 2, wherein the medium further comprises N-acetylmannosamine.
4. The method of claim 1, wherein the medium is serum free.
5. The method of claim 2, wherein the medium is serum free.
6. The method of claim 2, wherein the concentrations of galactose, mannose, and fructose are each from about 1 mM to about 10 mM.
7. The method of claim 3, wherein the concentration of N-acetylmannosamine in the medium is at least about 0.8 mM.
8. The method of claim 1, wherein the protein is a secreted, recombinant protein.
9. The method of claim 1, wherein the mammalian cells are CHO cells.
10. The method of claim 1, wherein the cells are cultured at a temperature from about 29°C to about 36°C.
11. A medium for culturing mammalian cells comprising galactose and fructose.
12. The medium of claim 11, further comprising mannose.
13. The medium of claim 12, further comprising N-acetylmannosamine.
14. The medium of claim 12, wherein the concentrations of galactose, mannose, and fructose are each from about 1 mM to about 10 mM.
15. The method of claim 13, wherein the concentration of N-acetylmannosamine in the medium is at least about 0.8 mM.
16. The medium of claim 11, wherein the medium is serum free.
17. The medium of claim 12, wherein the medium is serum free.
18. The medium of claim 13, wherein the medium is serum free.

19. A method for controlling the sialic acid content of a protein comprising culturing a mammalian cell that produces the protein in medium comprising N-acetyl-mannosamine and galactose.

20. The method of claim 19, wherein the medium further comprises fructose and mannose.

21. The method of claim 20, wherein the concentration of fructose in the medium is from about 1.5 mM to about 4.5 mM and wherein the concentration of mannose in the medium is from about 1.5 mM to about 4.5 mM.

22. The method of claim 19, wherein the cell is cultured at a temperature from about 29°C to about 35°C.

23. The method of claim 19, wherein the concentration of N-acetyl-mannosamine in the medium is at least about 0.8 mM and wherein the concentration of galactose in the medium is from about 1.5 mM to about 4.5 mM.

24. The method of claim 19, wherein the protein is a secreted protein.

25. The method of claim 19, wherein the protein is a recombinant protein.

26. The method of claim 19, wherein the cell is a CHO cell.

27. In a medium for culturing mammalian cells, the combination with the medium of galactose and N-acetylmannosamine.

28. The medium of claim 27, wherein the medium further comprises fructose and mannose.

29. The medium of claim 28, wherein the concentration of fructose in the medium is from about 1.5 mM to about 4.5 mM and wherein the concentration of mannose in the medium is from about 1.5 mM to about 4.5 mM.

30. The medium of claim 27, wherein the concentration of N-acetyl-mannosamine in the medium is at least about 0.8 mM and wherein the concentration of galactose in the medium is from about 1.5 mM to about 4.5 mM.

31. The medium of claim 27, wherein the mammalian cells are CHO cells.

32. The medium of claim 27, wherein the medium is serum-free.

33. In a method for producing a protein by culturing mammalian cells that express the protein, the improvement comprising culturing the mammalian cells at a temperature from about 29°C to about 36°C in a medium comprising N-acetyl-mannosamine.

34. The method of claim 33, wherein the medium further comprises galactose.

35. The method of claim 34, wherein the medium further comprises fructose and mannose.

36. The method of claim 35, wherein the concentration of galactose in the medium is from about 1.5 mM to about 4.5 mM, wherein the concentration of mannose in the medium is from about 1.5 mM to about 4.5 mM, and wherein the concentration of fructose in the medium is from about 1.5 mM to about 4.5 mM.

37. The method of claim 33, wherein the concentration of N-acetylmannosamine in the medium is at least about 0.8 mM.

38. The method of claim 33, wherein the medium is serum-free.

39. The method of claim 33, wherein the mammalian cells are CHO cells.

40. The method of claim 33, wherein the protein is a secreted, recombinant protein.

41. A method for controlling the sialic acid content of a recombinant protein comprising culturing mammalian cells that express the recombinant protein at a temperature from about 29°C to about 36°C in a medium comprising fructose, galactose, mannose, and N-acetylmannosamine,

wherein the concentration of fructose in the medium is from about 1.0 mM to about 5.0 mM,

wherein the concentration of galactose in the medium is from about 1.0 mM to about 5.0 mM,

wherein the concentration mannose in the medium is from about 1.0 mM to about 5.0 mM, and

wherein the concentration N-acetylmannosamine in the medium is at least 0.8 mM.